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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/820,933

03/30/2001

Hideyo Makino

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03/03/2005

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

PHAM, HAI CHI

ART UNIT

PAPER NUMBER

2861

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/820,933

Applicant(s)

MAKINO, HIDEYO

Examiner

Hai C. Pham

Art Unit

2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on RCE (12/02/04) & Amendment (10/04/04).
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,8-11,13-16,18-23 and 25-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-11,13-16,18-23 and 25-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Request for Continued Examination

1. The request filed on 12/02/04 for a Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 09/820,933 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 4-6, 9-11, 14-16, 19-21, 23, 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. (U.S. 6,101,018) in view of Hamada et al. (U.S. 6,246,463) and Ito et al. (U.S. 5,786,594).

Naiki et al. discloses a multi-beam scanning apparatus comprising a laser diode array (2, Fig. 6) having at least three light emitting points (2a-2f) arranged in a package at an equal interval (D) and configured to emit respective laser beams that form corresponding laser beam spots on a recording medium (25) at a minimum recording interval (when the print mode is set to the highest density, namely at 1200 dpi as displayed in Fig. 7C), wherein the laser beams from the at least three light emitting points scan the recording medium in a main scanning direction while being at least one

of on and off (driver On/Off signal, Fig. 5) so as to form a light image having the minimum recording interval in the recording medium, the equal interval (D) is not greater than the minimum recording interval, irrespective of an image density (the light emitting points 30a-30f remain *fixed* at equal distance D of $21.2 T_m$, which is equal to the minimum recording interval or pitch of the recording spots corresponding to the highest density of 1200 dpi, irrespective of the image density as shown in Fig. 7B at density of 600 dpi and in Fig. 7C at density of 1200 dpi), and the at least three light emitting points are arranged such that the corresponding laser beams spots on the recording medium are arranged substantially in a line in a direction orthogonal to the main scanning direction (the laser beam spots 30a-30f corresponding to the light emitting points 2a-2f, respectively, Fig. 7C). Naiki et al. further teaches the laser beam spots configured to be arranged in a line in a distance not greater than $21.27 T_m$ (Fig. 7C).

However, Naiki et al. fails to teach a holder comprising a mounting portion, an engaging section and a projection, the projection configured to receive a collimator, an aperture and a bracket contacting the holder, and any one of the laser beams being used as a clock laser beam to determine a timing of starting each main scanning (referring to the base claims).

Ito et al. discloses a multi-beam scanning optical device comprising a plurality of light sources (10, 11) being mounted on a holders (21, 22) mounted on the holder (23), which is provided with a projection surrounding the through holes (23a, 23b) to receive the collimator lenses (12, 13), an aperture (19, 20) disposed on the projection, and engaging section (through holes on the holder 23 for receiving the screws 24a-24d),

and a bracket (main plate 25) defining an engaging hole (through holes for receiving screws 24a-24d) contacting the engaging section of the holder (or through holes of holder 23) to permit connection of the holder and the bracket (Fig. 5).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the laser holder into the device of Naiki et al. as taught by Komatsu. The motivation for doing so would have been to stably mount the light sources along with the respective collimating lenses and apertures.

On the other hand, Hamada et al. teaches a multi-beam scanning apparatus in which any one of the laser beams (301a-301c) is used as a clock laser beam (reference beam) configured to determine a timing of starting each main scanning via the delay time setting circuit such that the beams spots (401a-401c) are aligned along the start line (610) in a direction orthogonal to the main scanning direction (Figs. 6A-6C).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al. with the aforementioned teaching of Hamada et al. The motivation for doing so would have been to provide a simple method of aligning the scanning start positions for all laser beams emitted at one time for every scanning process while increasing the life of the semiconductor laser array, as suggested by Hamada et al.

4. Claims 3, 8, 13, 18, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al. and Ito et al., as applied to claims 1, 2, 6, 11, 16 above, and further in view of Nakayama (JP 5-6077).

Naiki et al., as modified by Hamada et al. and Ito et al., discloses all the basic limitations of the claimed invention except for the abnormal lighting detector, and the laser beam changer configured to change the clock laser beam to any one of the laser beams in case of detected abnormality.

However, Nakayama discloses an image forming device using plural light sources, and a detecting device (29) for detecting an abnormality in the emitting state of the light sources (25) such that only normal light sources are used for forming image.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al., as modified by Hamada et al. and Ito et al., with the aforementioned teaching of Nakayama for the purpose of adjusting the scan timing of each of the laser beams.

5. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al. and Ito et al. ('594), as applied to claim 21 above, and further in view of Ito (U.S. 5,471,236).

Naiki et al., as modified by Hamada et al. and Ito et al. ('594), discloses all the basic limitations of the claimed invention except for the claimed relationship, which involves the focal distances of the collimator lens and the beam-shaping lens, respectively.

However, it is well known in the art of printing that the overall lateral magnification (m) of an optical scanning device is defined as a product of the lateral magnification of the pre-deflection optical system (m_1) (comprising a collimator lens and

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a condenser lens) and that of the post-deflection optical system (m_2) (including the imaging lenses) as exemplified by Ito ('236):

$$m = m_1 \cdot m_2 = (f_2/f_1) \cdot m_2$$

where, f_1 is the focal distance of the collimator lens, and

f_2 is the focal distance of the cylindrical lens.

Therefore,

$$\begin{aligned} p &= L / m \\ &= L / [(f_2/f_1) \cdot m_2] \\ &= (f_1/f_2) \cdot (L/m_2) \end{aligned}$$

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the above teaching of Ito into the calculation of the scanning pitch in the device of Naiki et al., as modified by Hamada et al. and Ito et al. ('594), since Ito ('236) teaches this to be known in the art that such determination of the scanning pitch would include the characteristics of the pre-deflection optical system.

6. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naiki et al. in view of Hamada et al. and Ito et al., as applied to claim 21 above, and further in view of Komatsu (U.S. 5,774,248).

Naiki et al., as modified by Hamada et al. and Ito et al., discloses all the basic limitations of the claimed invention except for the centers of the light beam spots on the

recording medium deviating less than $1/2$ from a target distance between centers of the light beam spots and a line in the main scanning direction.

Komatsu discloses a multi-beam scanning apparatus in which the laser diode array (1) with a plurality of light emitting points arranged at equal intervals is adjusted such that the position deviation of the vertical line connecting the centers of the light beam spots in the sub-scanning direction is corrected, the position deviation being less than $1/2$ from a target distance between centers of the light beam spots and a line in the main scanning direction (Figs. 11-12) (col. 11, lines 13-54).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Naiki et al., as modified by Hamada et al. and Ito et al., with the aforementioned teaching of Komatsu regarding the alignment of the laser beam spots. By doing so, it is possible to correctly align the light beams in a vertical line in the sub-scanning direction as a starting point.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3-6, 8-11, 13-16, 18-23 and 25-30 have been considered but are moot in view of the new grounds of rejection presented in this Office action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (571) 272-1934. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



HAI PHAM
PRIMARY EXAMINER

February 25, 2005